THAT WHICH IS CLAIMED IS:

1. A reflector antenna system comprising:

at least one antenna reflector having an arcuate shape and defining an antenna beam;

a feed device spaced apart from said at least one antenna reflector; and

a phased array antenna positioned in the antenna beam between said at least one antenna reflector and said feed device, said phased array antenna comprising

a substrate,

a plurality of back-to-back pairs of first antenna elements carried by said substrate and configured for defining at least one feed-through zone for the antenna beam, and

a plurality of back-to-back pairs of second antenna elements carried by said substrate and defining at least one active beamsteering zone for the antenna beam.

2. The reflector antenna system of Claim 1 wherein said phased array antenna further comprises a controller for configuring said back-to-back pairs of first and second antenna elements to respectively define the at least one feed-through zone and the at least one active beamsteering zone.

3. The reflector antenna system of Claim 2 wherein said phased array antenna further comprises a respective phase shifter connected between each pair of

back-to-back first antenna elements and each pair of back-to-back second antenna elements, and wherein said controller controls a phase of said phase shifters.

4. The reflector antenna system of Claim 1 further comprising a respective gain element also connected between each pair of back-to-back first antenna elements and each pair of back-to-back second antenna elements, and wherein said controller also controls a gain of said gain elements.

5. The reflector antenna system of Claim 1 further comprising a gimbal carrying said feed device.

6. The reflector antenna system of Claim 1 further comprising a transmitter connected to said feed device.

7. The reflector antenna system of Claim 1 further comprising a receiver connected to said feed device.

8. The reflector antenna system of Claim 1 wherein each of said first and second antenna elements comprises a dipole antenna element comprising a medial feed portion and a pair of legs extending outwardly therefrom, and wherein adjacent legs of adjacent dipole antenna elements include respective spaced apart end portions.

9. The reflector antenna system of Claim 8 wherein the spaced apart end portions have predetermined shapes and relative positioning to provide increased capacitive coupling between said adjacent dipole antenna elements.

10. The reflector antenna system of Claim 8 further comprising a respective impedance element electrically connected between the spaced apart end portions of adjacent legs of adjacent dipole antenna elements.

11. The reflector antenna system of Claim 10 wherein each respective impedance element comprises at least one of an inductor and a capacitor.

12. A reflector antenna system comprising:

at least one antenna reflector having an arcuate shape and defining an antenna beam;

a feed device spaced apart from said at least one antenna reflector;

a transceiver connected to said feed device; and

a phased array antenna positioned in the antenna beam between said at least one antenna reflector and said feed device, said phased array antenna comprising

a substrate,

a plurality of back-to-back pairs of first antenna elements carried by said substrate and

configured for defining at least one feed-through zone for the antenna beam, and

a plurality of back-to-back pairs of second antenna elements carried by said substrate and defining at least one active beamsteering zone for the antenna beam.

13. The reflector antenna system of Claim 12 wherein said phased array antenna further comprises a controller for configuring said back-to-back pairs of first and second antenna elements to respectively define the at least one feed-through zone and the at least one active beamsteering zone.

14. The reflector antenna system of Claim 13 wherein said phased array antenna further comprises a respective phase shifter connected between each pair of back-to-back first antenna elements and each pair of back-to-back second antenna elements, and wherein said controller controls a phase of said phase shifters.

15. The reflector antenna system of Claim 12 further comprising a gimbal carrying said feed device.

16. The reflector antenna system of Claim 12 wherein each of said first and second antenna elements comprises a dipole antenna element comprising a medial feed portion and a pair of legs extending outwardly therefrom, and wherein adjacent legs of adjacent dipole antenna elements include respective spaced apart end portions.

17. The reflector antenna system of Claim 16 wherein the spaced apart end portions have predetermined shapes and relative positioning to provide increased capacitive coupling between said adjacent dipole antenna elements.

18. The reflector antenna system of Claim 16 further comprising a respective impedance element electrically connected between the spaced apart end portions of adjacent legs of adjacent dipole antenna elements.

19. A method for using a phased array antenna comprising a substrate, a plurality of back-to-back pairs of first antenna elements carried by the substrate, a plurality of back-to-back pairs of second antenna elements carried by the substrate, the method comprising:

positioning the phased array antenna between at least one antenna reflector having an arcuate shape and a feed device, and in an antenna beam defined by the at least one antenna reflector;

configuring the back-to-back pairs of first antenna elements to define at least one feed-through zone for the antenna beam; and

configuring the back-to-back pairs of second antenna elements to define at least one active beamsteering zone for the antenna beam.

20. The method of Claim 19 wherein the phased array antenna further comprises a respective phase

shifter connected between each pair of back-to-back first antenna elements and each pair of back-to-back second antenna elements; and further comprising controlling a phase of the phase shifters.

21. The method of Claim 19 further comprising connecting a transmitter to the feed device.

22. The method of Claim 19 further comprising connecting a receiver to the feed device.

23. The method of Claim 19 wherein each of the first and second antenna elements comprises a dipole antenna element comprising a medial feed portion and a pair of legs extending outwardly therefrom, and wherein adjacent legs of adjacent dipole antenna elements include respective spaced apart end portions.